

REMARKS

The Examiner has rejected Claims 1-10, 12-18 and 20 under 35 U.S.C. 102(b) as being anticipated by Hopkins et al. (U.S. Patent No. 6,187,685).

Applicants respectfully traverse Examiner's rejection and request reconsideration for the following reasons.

Applicants have cancelled claims 1-20 without prejudice or disclaimer and have submitted herewith new claims 21-38 to more clearly define the invention.

Applicants agree that Hopkins et al. disclose a process of anisotropically etching a silicon substrate on an insulating layer of silicon oxide, wherein the substrate is subjected to an alternating cyclic process of etching and deposition process and also disclose the use of a pulsed RF bias voltage in conjunction with a high density plasma source (ICP) in order to reduce or eliminate notching (col. 2, lines 28-43 and col.3, lines 3-6 of U.S. Patent No. 6,187,685).

However, it is very important to understand that the RF power supplied to the high density source is distinct and separate from the RF power supplied to the substrate (bias). In regard to U.S. Patent No. 6,187,685, Hopkins et al. disclose the use of pulsed RF bias in conjunction with an alternating etch and deposition process, but Hopkins et al. do not teach or suggest the use of a pulsed high density plasma source in

conjunction with an alternating etch and deposition process. Furthermore, Hopkins et al. do not teach or suggest the use of a pulsed high density plasma source in conjunction with a pulsed RF bias for an alternating etch and deposition process.

In actuality, Hopkins et al. teach away from the use of a pulsed high density source to alleviate notching. Specifically, Hopkins et al. state:

However, for relatively higher pressure plasma (approaching or greater than 10 mTorr), the plasma does not extinguish, even at low bias RF power levels. In such cases the source pulsing method is not suitable (col. 2, lines 12-15 of U.S. Patent No. 6,187,685).

The Examiner references Hopkins et al. as disclosing “the bias voltage is pulsed by repetitive switching to on-off position during the “on” or “off” part of the power supply (ICP) (col. 5, lines 54-59 and col. 10, lines 14-20).” This quotation from Page 2 of the Office Action incorrectly associates the term “ICP” as the power supply that is being pulsed. There is no reference or implication in column 5 or column 10 of U.S. Patent No. 6,187,685 that the power supply that is being repetitively switched is a high density plasma source such as ICP. Instead, it is evident from the specification of U.S. Patent No. 6,187,685 that the pulsing of the power supply refers only to the bias that is being supplied to the substrate. See col. 5, lines 42 – 45 of U.S. Patent No. 6,187,685 which state:

If the RF bias applied to the Platen is pulsed on and off, during the off periods the ion sheath will relax to the steady dc situation in which the wafer reaches conventional plasma floating potential.

See also, col. 2, lines 53-60 of U.S. Patent No. 6,187,685 which state:

The bias frequency may be produced by an rf or dc bias power supply, and is preferably applied to a support or platen on which the substrate may be positioned. A dc bias which is pulsed is particularly suitable if the substrate is sufficiently conducting or is of a form where most of the material is conducting but a thin insulating layer may exist within the structure. The dc bias may be pulsed in conjunction with CW or pulsed RF bias.

Whereas, new Claim 21 of Applicants' invention claims "pulsing the high density plasma source in at least one step of the cyclic process". In view of the fact that Hopkins et al. do not teach or suggest the pulsing of a high density plasma source to reduce notching, New Claim 21 and all of the new dependent claims (22-38) therefrom, should be allowable.

The Examiner has rejected Claims 11 and 19 under 35 U.S.C. 103(a) as being unpatentable over Hopkins et al. Applicant respectfully traverses Examiner's rejection and requests reconsideration for the following reasons.

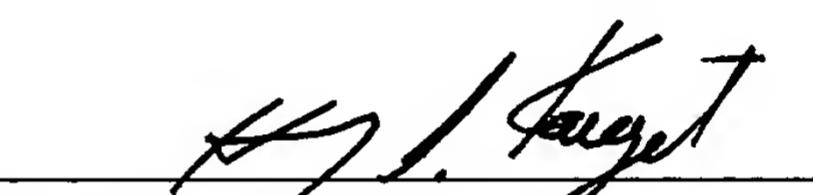
As stated hereinabove, Hopkins et al. do not disclose or suggest the claimed invention. Hopkins et al. only teach the pulsing of the bias to reduce notching. Whereas, Applicants teach the pulsing of a high density plasma source to reduce notching.

In addition, Claims 11 and 19 have been cancelled without prejudice or disclaimer.

It is therefore respectfully urged that a prima facie showing of anticipation or obviousness has not been made.

All grounds of rejection having been overcome by the amendments hereinabove, reconsideration and a Notice of Allowance is respectfully requested.

Respectfully submitted,



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